Installation Manual

Model #'s: MCD-102-CH (-x)
MCD-102-RU (-x)
MCD-103-CH (-x)
MCD-102-CP-x
MCD-104-01-x

10 Disc CD Player/Changer

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Service Bulletin List

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MODEL #'s: MCD-102-CH (-x)
MCD-102-RU (-x)
MCD-103-RU (-x)
MCD-102-CP (-x)
MCD-104-01-x

10 Disc CD Player/Changer

1.0 General Information

1.1 Introduction

This manual contains information for the installation of Audio International, Inc. (AI) 10 Disc CD Player/Changer, Model number MCD-102-CH (-x) control head, model number MCD-102-RU (-x) remote unit, model number MCD-103-RU (-x) remote unit, model number MCD-103-RU (-x) remote unit, and model number MCD-102-CP (-x) control panel. Also included in this manual is model number MCD-104-01-x. This unit combines the MCD-102-CH (-x) and the MCD-102-RU (-x) units into one compact enclosure.

The "-x" suffix included in the model number designates the type of connector utilized. Refer to Section 3.7 for details. Information contained within this publication includes physical and electrical characteristics with additional references needed for installation.

1.2 Purpose of the Equipment

The MCD 10 Disc CD Player/Changer is a high quality CD player/changer specifically designed to meet the special requirements of aircraft use. This CD player/changer has the capability of storing up to ten, 5.0 inch CD discs and can be mounted at various angles in the aircraft. Each CD player/changer includes a control head and a remote unit where the CD's are stored.

1.3 Operational Features

Listed below are key features of the MCD units:

- DO-160C tested
- Operates directly from +28 VDC
- Compact, lightweight package
- Backlit LCD indicator (green) with front panel controls
- Optional infrared remote control capability
- AI proprietary RS-485 digital data bus compatible
- Frequency response of 20 Hz to 20 kHz (+/-1dB)
- Adjustable audio output level of 1V to 5V RMS
- Standard plating options for front bezel
- No cooling requirements
- Specially designed to meet aircraft standards

1.4 Optional Equipment

The front bezel of the units can be customized to match the interior style of any aircraft. They can be plated or painted to match any interior. Stacking units are available from AI to house multiple source equipment units.

Contact your AI representative for details.

2.0 Application

2.1 Introduction

The MCD 10 Disc CD Changer/Player is a compact disc changer system comprised of the remote unit and a CD changer. The remote unit modulates the audio signal from the CD changer into a frequency signal so that it can be received by the aircraft audio.

2.2 Data Bus

The MCD units are designed to interface with other Audio International equipment via AI's proprietary RS-485 serial data bus.

2.3 Potentiometer Settings

Right and left output level adjustments are located on the rear of the unit. The adjustment potentiometers allow the user to adjust the output between 1 volt and 5 volts RMS. To increase the level, turn the potentiometer screw clockwise; to decrease turn the screw counterclockwise.

3.0 Installation

3.1 Prior to Installation

Prior to installation, the following items should be considered:

3.1.1 During the design and layout of the aircraft cabin, careful consideration of the location of this module is necessary. Some of the items to be considered include:

- Space
- Available power supply
- Environmental conditions (temperature, humidity, etc.)
- Length of cable runs

3.1.2 The MCD unit shall be installed to conform to the standards designated by the customer, installing agency, and existing conditions as to the unit location and type of installation.

3.1.3 Mounting screws are required to secure the unit. Refer to Section 6.0, Reference Drawings, for mounting hole diameters and configuration.

3.1.4 The CD control head and CD remote units cannot function properly if they are more than 15 feet away from each other.

3.2 Unpacking and Inspection

Carefully open the packaging and remove the unit. Verify that all components have been included in the package per the packing list. Inspect the unit for damage. Retain the packing materials and packing list.

If damage has occurred during shipping, a claim must be filed with AI within 24 hours and a “Return Request Authorization Number” must be obtained from AI. Refer to the front cover of this manual for address and telephone number of Audio International. Repackage the unit in its original packaging materials and return it to AI following instructions given by the AI representative. If no return is necessary, retain the packing materials for storage or reshipment if necessary.

3.3 *Cautions and Warnings*

3.3.1 It is important to do a pin-to-pin power and ground check on all connectors. Ensure that power and ground are applied only where specified. Damage to the unit may result if power or ground is applied to the wrong points.

3.3.2 **DO NOT** connect or disconnect the unit while power is applied.

3.3.3 **DO NOT** remove any factory-installed screws. Damage to the units may result and void any warranties.

3.3.4 **DO NOT** touch the liquid crystal fluid if the LCD case is damaged or broken. It may be dangerous and cause serious harm. If your body or clothing come in contact with the fluid, wash immediately with soap and water.

3.3.4 **ESD** (Electro Static Discharge) guidelines shall be followed.

3.4 Wiring Requirements

3.4.1 Introduction

The installing agency shall supply and fabricate all external cables and mating connectors. The length and routing of external cables must be carefully studied and planned before attempting installation of the equipment. Allow adequate space for installation of cable and connectors. Avoid sharp bends and placing cables near aircraft control cables. Maintain a minimum clearance of three (3) inches from any control cable. If wiring is run parallel to combustible fluid or oxygen lines, maintain a separation of six (6) inches between the lines.

3.4.2 Power Wires

All power and ground wires shall be 22 AWG (minimum). Power ground wires shall be grounded within twelve (12) inches of the unit. All wires shall be in accordance with **MIL-W-22759** or equivalent. Protect power wires with circuit breakers or fuses located close to the electrical power source bus.

3.4.3 Audio Lines

All audio lines are 24 AWG (minimum) twisted shielded pair with the cable shields properly grounded. Twisted, shielded cable shall be in accordance with **MIL-W-27500** or equivalent.

3.4.4 Data Bus Lines

All data bus connections require twisted shielded cable with the cable shields properly grounded. Twisted, shielded cable must be in accordance with **MIL-W-27500** or equivalent. The wire size for the conductors in this cable is to be 22 AWG (minimum). The shield is to be connected wherever a shield pin is provided. Shield terminations are to be made as close to the connector pin as possible. In the event shield pins are not provided, the data bus shield must be terminated per AI's proprietary RS-485 specification.

All equipment on the RS-485 data bus shall be connected in a "daisy-chain" configuration. AI's proprietary RS-485 serial data bus specification is available upon request.

3.5 Physical Characteristics

3.5.1 Refer to Section 5.0 for unit dimensions.

3.5.2 Refer to Section 6.0 for attachment points.

3.5.3 When mounting the unit, allow sufficient space for mating connectors.

3.6 Electrical Characteristics

3.6.1 Refer to Section 5.0 for electrical specifications.

3.6.2 Standard configuration requires no infrared strap pins to be connected. Each different type of AI source equipment can be configured to accept one of four different sets of infrared codes. To change the code settings, connect one of the strap pins to the strap common (never connect more than one strap pin to the strap common). Three strap pins are available to allow the infrared codes to be configured.

3.6.3 The MCD-102-CH control head unit utilizes two 15-pin connectors for electrical connections. P1 connector provides +28 VDC, left/right audio output, data bus control, infrared input, and four (4) strapping pins for alternate configuration of infrared digital command codes. P2 connects to the changer unit MCD-102-RU. P2 provides +12 VDC power, control lines 1 through 4, and audio input.

Maximum wire length between the control head and remote unit is 15 feet.

3.6.4 The MCD-102-RU remote unit utilizes one 15-pin connector for electrical connections. This connector provides +12 VDC power input, control lines 1 through 4, and audio output. Up to ten 5-inch CD disc may be placed in the magazine.

3.6.5 The MCD-103-CH control head is identical to the MCD-102-Ch control head with an additional pigtail connector. This connector is to be connected to the MCD-102-CP control panel. P3 of this unit provides IMH, data input, ground, chip enable, clock, VDD power and switching through the control panel. The maximum wire length between the CH and CP units is 15 feet.

3.6.6 The MCD-104-01-x has been designed to combine the control head unit and the remote unit into one enclosure. The unit requires on 15-pin connector for electrical connections. P1 provides +28 VDC power, ground, left/right audio output, data bus control, infrared input, and four strapping pins for alternate configuration of the infrared digital command codes.

3.7 Mating Connector Information

All wiring harnesses to the unit are supplied and fabricated by the installing agency.

Model #	Pin #	Connector	Mating Connector
MCD-102-CH-1	P1	RD15M10JV30	RD15F10JVL0
	P2	RD15F10JVL0	RD15M10JV30
MCD-102-CH-2	P1	DAMA-15P D20418-2 Female Screwlock	DAMA-15S
	P2	DAMA-15S D20419-18 Male Screwlock	DAMA-15P
MCD-102-RU-1 (-3)		RD15M10JV30	RD15F10JVL0
MCD-102-RU-2 (-4)		DAMA-15P D20418-2 Female Screwlock	DAMA-15S
MCD-102-CP-1		RD9M10JVL0	RD9F10JVL30
MCD-102-CP-2		DEMA-9P D20418-2 Female Screwlock	DEMA-9S
MCD-103-CH-1	P1	RD15M10JV30	RD15F10JVL0
	P2	RD15F10JVL0	RD15M10JV30
	P3	RD9F10JV30	RD9M10JVL0
MCD-103-CH-2	P1	DAMA-15P D20418-2 Female Screwlock	DAMA15S
	P2	DAMA-15S D20419-18 Male Screwlock	DAMA-15P
	P3	DEMA-9S D20419-21 Male Screwlock	DEMA-9P
MCD-104-01-1	P1	RD15M10JV30	RD15F10JVL0
MCD-104-01-2	P1	DAMA-15P D20418-2 Female Screwlock	DAMA-15S

3.8 Pinout Assignment Descriptions

3.8.1 The MCD-102-CH (-x) pinout is as follows:

P1	
Pin #	**Description**
1	+28 VDC Power In
2	Ground
3	R+ Audio Output
4	R- Audio Output
5	L+ Audio Output
6	L- Audio Output
7	Data Bus (A)
8	Data Bus (B)
9	Infrared Input +
10	Infrared Input -
11	IR Strap 2
12	IR Strap 3
13	IR Strap 4
14	IR Strap Common
15	Reserved

P2	
Pin #	**Description**
1	+12 VDC Power Output
2	Ground
3	Control 1
4	Control 1
5	Control 3
6	Control 4
7	Reserved
8	Reserved
9	R+ Audio Input
10	R- Audio Input
11	L+ Audio Input
12	L- Audio Input
13	Reserved
14	Reserved
15	Reserved

3.8.2 The MCD-103-CH* (-x) pinout is as follows:

P1	
Pin #	**Description**
1	+28 VDC Power
2	Ground
3	R+ Audio Output
4	R- Audio Output
5	L+ Audio Output
6	L- Audio Output
7	Data Bus (A)
8	Data Bus (B)
9	Infrared Input +
10	Infrared Input -
11	IR Strap 2
12	IR Strap 3
13	IR Strap 4
14	IR Strap Common
15	Reserved

P2	
Pin #	**Description**
1	+12 VDC Out
2	Ground Out
3	Control 1
4	Control 2
5	Control 3
6	Control 4
7	Reserved
8	Reserved
9	R+ Audio Input
10	R- Audio Input
11	L+ Audio Input
12	L- Audio Input
13	Reserved
14	Reserved
15	Reserved

P3	
Pin #	**Description**
1	IMH
2	DATA
3	Ground
4	CE
5	CLK
6	VDD
7	Switch
8	Reserved
9	Reserved

**The MCD-103-CH (-x) utilizes the MCD-102-RU (-x) remote unit.*

3.8.3 The MCD-102-CP (-x) remote control panel pinout is as follows:

Pin #	Description
1	IMH
2	Data
3	Shield (Ground)
4	CE
5	CLK
6	VDD
7	Switch
8	Reserved
9	Reserved

3.8.4 The MCD-102-RU (-x) remote unit pinout is as follows:

Pin #	Description
1	+12 VDC Power Input
2	Ground Input
3	Control 1
4	Control 2
5	Control 3
6	Control 4
7	Reserved
8	Reserved
9	R+ Audio Output
10	R- Audio Output
11	L+ Audio Output
12	L- Audio Output
13	Reserved
14	Reserved
15	Reserved

3.8.5 The MCD-104-01-x pinout is as follows:

Pin #	Description
1	+28 VDC Power In
2	Ground
3	R+ Audio Output
4	R- Audio Output
5	L+ Audio Output
6	L- Audio Output
7	Data Bus (A)
8	Data Bus (B)
9	Infrared Input +
10	Infrared Input -
11	IR Strap 2
12	IR Strap 3
13	IR Strap 4
14	IR Strap Common
15	Reserved

3.9 Post-Installation Test

3.9.1 With the aircraft power “ON”, apply power to the CD control head and remote units (if applicable). Load the CD remote unit with one to ten 5-inch CD’s. Press the PL/ST (play/stop) button on the control head to start playback.

3.9.2 Select a CD with the DISC ADV (disc advance) or DISC REV (disc reverse) buttons. Select a specific track of the CD and press the TRACK ADV (track advance) or TRACK REV (track reverse) buttons. The LCD display will indicate the CD number and track that has been selected for playback as well as the elapsed time.

3.9.3 Press the PL/ST button on the control head. Press EJECT on the remote unit. Remove the CD’s from the CD magazine. If there is a diagnostic error in the CD changer system, the LCD indicator will

display several different error codes. Refer to Section 4.0 for a definition of these error codes.

4.0 Troubleshooting Guide

4.1 General Troubleshooting Procedures

Many problems can be isolated with the following general techniques:

- To verify power to the unit, recheck +28 VDC is applied to the proper pins on the unit. Use a voltmeter to verify correct level.
- Reset by removing power from the unit for at least one minute and reapply power. Verify the problem still exists.
- Recheck all connections to the unit for security. Check all harness runs for possible pinching. Recheck all pinouts for application accuracy.

4.2 Troubleshooting Chart

Problem	Possible Cause	Solution
Sound skips	CD remote unit is incorrectly installed	Reinstall unit
	CD is dirty or defective	Clean or replace CD
Disc magazine will not lock in the changer	CD magazine does not have proper loading orientation	Remove the disc magazine, press EJECT and reinsert magazine until it is locked securely into place
No sound	Power has not been connected	Verify +28 VDC power is present
	Power to external equipment is “off”	Verify source equipment is “on” and operational. Verify CD remote unit and control unit are “on”
	External equipment incorrectly connected	Verify all connections per unit instructions
Poor sound quality	Audio controls improperly adjusted	Adjust the volume level
Error code E-01	Disc magazine not inserted in the CD remote unit	Insert the disc magazine with CD’s into the CD changer
Error code E-02	No disc is inserted in the magazine	Remove magazine and insert a CD
Error code E-04	CD is dirty or incorrectly oriented	Clean CD, reinsert correctly
Error code E-99	CD changer cannot be operated due to difficulties	Press RESET on the CD remote unit

5.0 Specifications

5.1 Unit Specifications – MCD-102-CH (-x)
MCD-102-RU (-x)
MCD-103-CH (-x)
MCD-104-01-x

Physical Specifications	
Housing	Aluminum
Dimensions & Weight	
MCD-102-CH (-x) & MCD-103-CH (-x)	Length 7.89” / 20.04cm Width w/bezel 7.38” / 18.75cm Height 2.30” / 5.84cm Weight 2.06 lbs. / 0.93 kg
MCD-102-RU (-x)	Length 7.30” / 18.54cm Width w/bracket 12.63” / 32.00cm Height 3.60” / 9.14cm Weight 5.25 lbs. / 2.38 kg
MCD-104-01-x	Length 7.97” / 20.24cm Width w/bezel 14.00” / 35.56cm Height 4.22” / 10.72cm Weight 9.25 lbs. / 4.20 kg

Electrical Specifications	
Power	1A Maximum @ +28 VDC
Operating Voltage Range	+18 VDC - +30 VDC
Data Bus Type	AI Proprietary RS-485
Audio Frequency Response	20 Hz to 20 kHz
Audio Output	1 V to 5 V RMS (2K-ohms minimum load) Factory preset at 2 V RMS
Audio S/N	93 dB (nominal)
Dynamic Range	93 dB
Channel Separation	85 dB
Infrared Input	+5 VDC Digital Logic Level

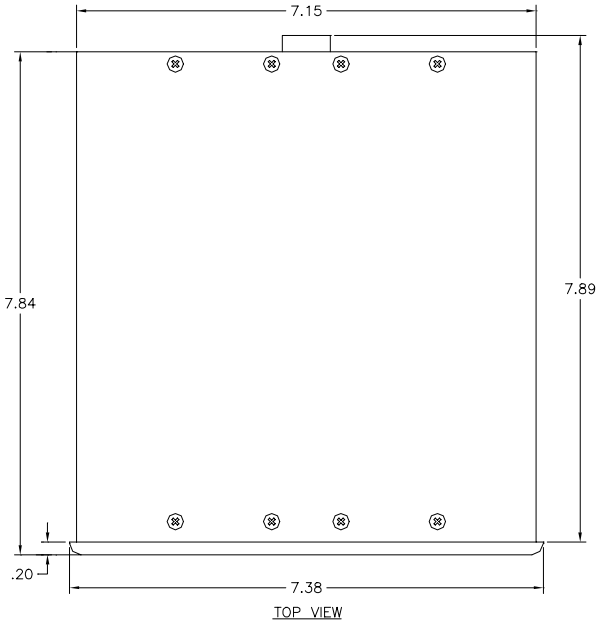
5.2 Unit Specifications – MCD-102-CP (-x)

Physical Specifications	
MCD-102-CP (-x)	Length 6.00” / 15.24cm Width 1.50” / 3.81cm Depth 0.69” / 1.75cm Weight 0.33 lbs. / 0.15 kg

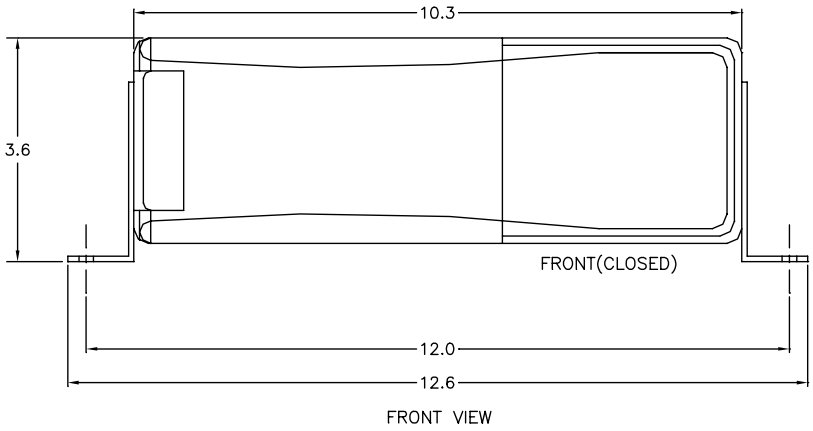
Electrical Specifications	
Power	130 mA @ +10 VDC
Wire Bundle	12 inches (+/- 1”)

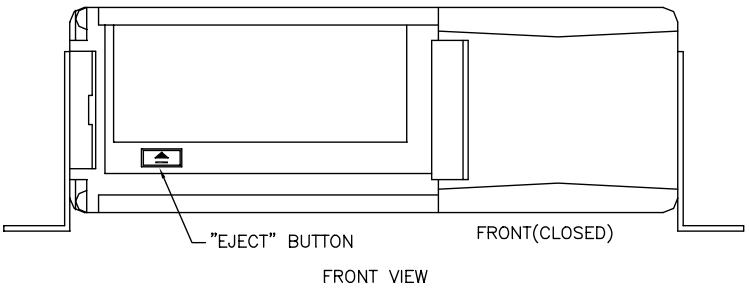
6.0 Reference Drawings

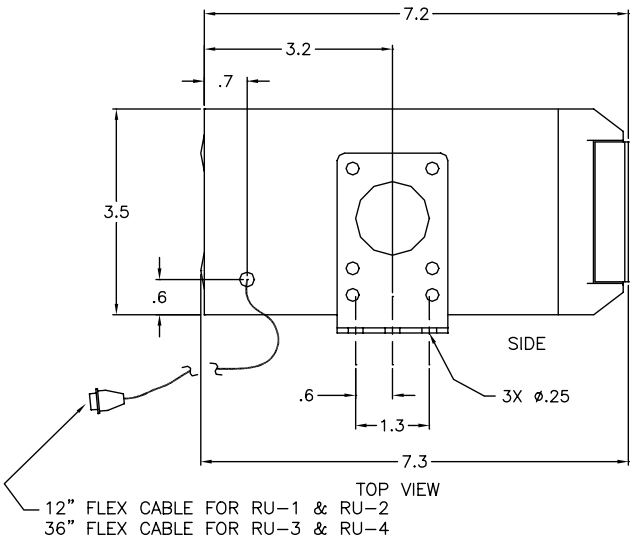
6.1 The following diagrams show the MCD-102-CH (-x) control head with unit dimensions and attachment points. All dimensions are shown in inches.



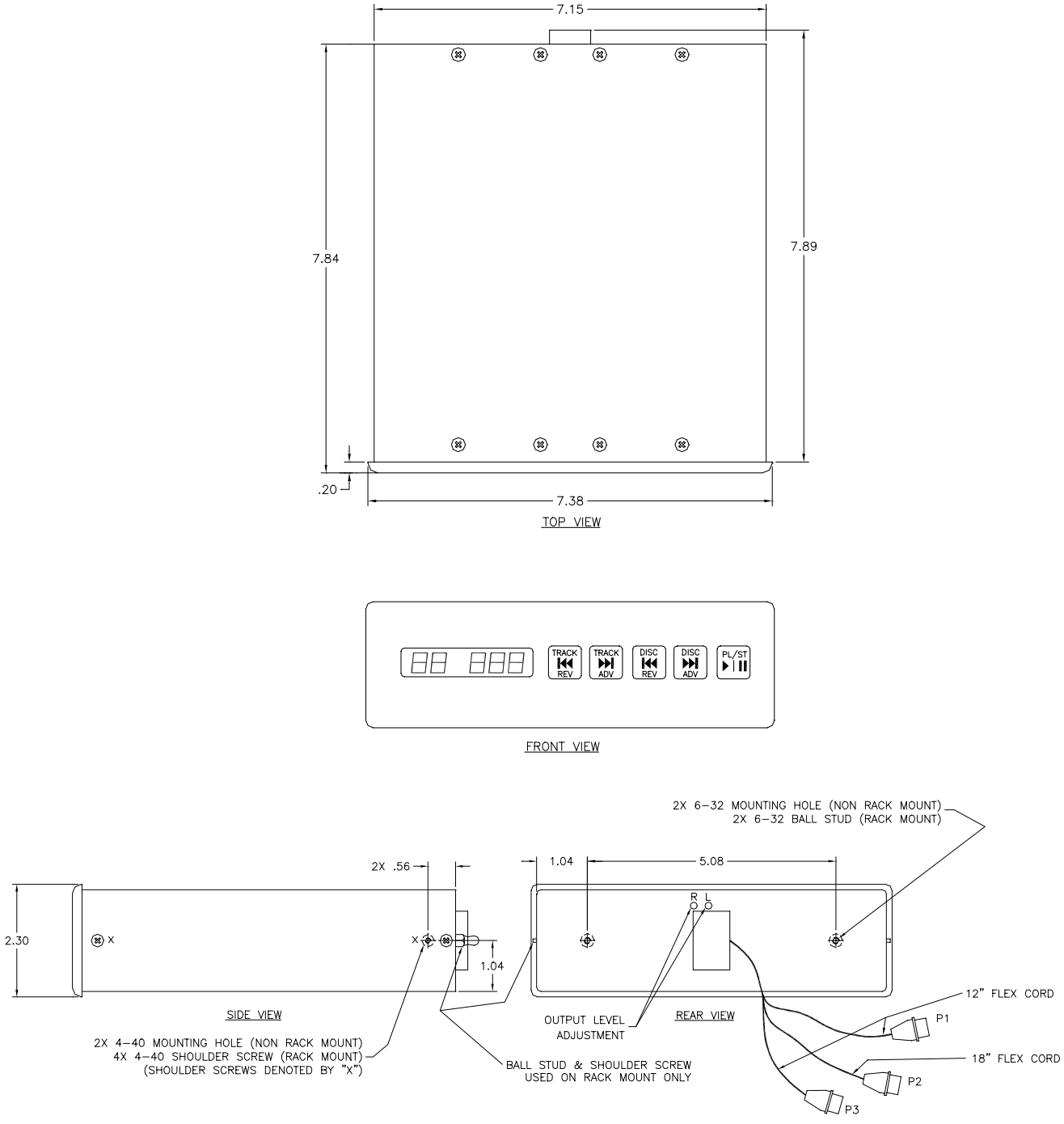
6.2 The following diagrams show the MCD-102-RU (-x) remote unit with unit dimensions and attachment points. All dimensions are shown in inches.



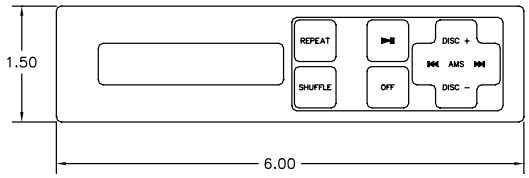


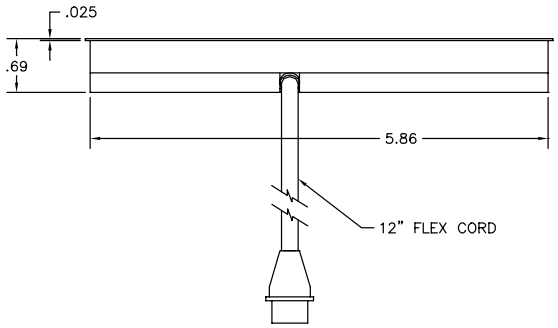


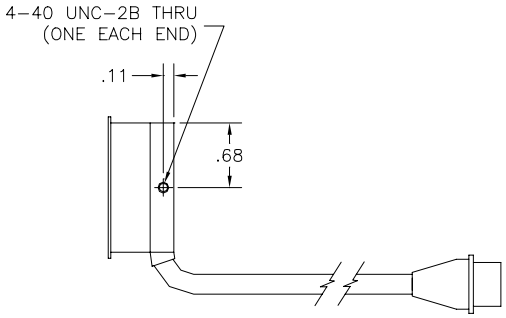
6.3 The following diagrams show the MCD-103-CH (-x) control head unit with unit dimensions. All dimensions are shown in inches.

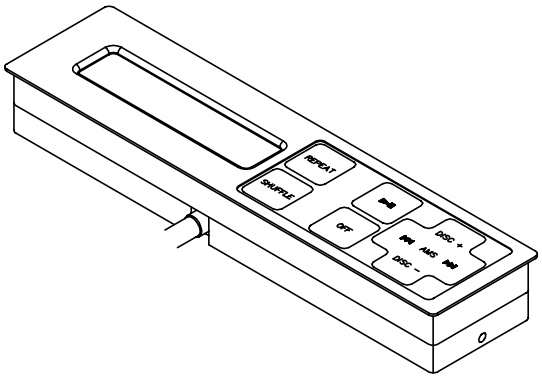


6.4 The following diagrams show the MCD-102-CP (-x) control head unit with unit dimensions. All dimensions are shown in inches.









6.5 The following diagrams show the MCD-104-01-x unit with dimensions. All dimensions are shown in inches.